Paying It Forward: Generalized Reciprocity and the Limits of Generosity

Running Head: PAYING IT FORWARD

Paying it Forward: Generalized Reciprocity and the Limits of Generosity

Kurt Gray[1], Adrian F. Ward[2] and Michael I. Norton[2]

[1]University of North Carolina, Chapel Hill

[2]Harvard University

In press, *Journal of Experimental Psychology: General*

Word count: 4,609

Corresponding author:

Kurt Gray
Department of Psychology
University of North Carolina, Chapel Hill
Chapel Hill, NC 27599

Email: kurtgray@unc.edu

Abstract

When people are the victims of greed or recipients of generosity, their first impulse is often to pay back that behavior in kind. What happens when people cannot reciprocate, but instead have the chance to be cruel or kind to someone entirely different—to *pay it forward*? In five experiments, participants received greedy, equal, or generous divisions of money or labor from an anonymous person, and then divided additional resources with a new anonymous person. While equal treatment was paid forward in kind, greed was paid forward more than generosity. This asymmetry was driven by negative affect, such that a positive affect intervention disrupted the tendency to pay greed forward. Implications for models of generalized reciprocity are discussed.

Keywords: Morality; Reciprocity; Indirect Reciprocity; Upstream Reciprocity; Gratitude; Victims; Altruism

Paying it Forward and the Limits of Generosity

Paying it forward is a heart-warming notion, one that has long captured the attention of luminaries—Ralph Waldo Emerson (1841) and Benjamin Franklin (1784)—laypeople (Hyde, 2000), psychologists (Bartlett & Desteno, 2006; Fowler & Christakis, 2010), evolutionary biologists (Bshary & Grutter, 2006; Rutte & Taborsky, 2007), and game theorists (Diekmann, 2004; Nowak & Sigmund, 2005; Putnam, 2001). The concept is simple: A is kind to B, and B—rather than paying that kindness *back* to A—pays it *forward* to C. C then pays that kindness forward to D, and so on, creating a chain of goodwill. Paying kindness forward—or "generalized reciprocity"—operates according to a simple maxim: "help anyone, if helped by someone" (Rankin & Taborsky, 2009). On any given day, however, people are the recipients of not only kind or generous behavior ("help"), but also of equal and greedy treatment. Which kind of behavior—equality, greed, or generosity—is more likely to be paid forward? We predict that while equality will be consistently paid forward, greed will propagate more than generosity.

Paying it forward is typically researched in its most prototypical—and optimistic—form, with both experiments and mathematical models demonstrating the propagation of generosity in both humans (Bartlett & Desteno, 2006; Stanca, 2009), and animals (Rankin & Taborsky, 2009). These chains of goodwill, however, are unstable because they are easily exploited by defectors—that is, those who receive generosity without being generous to others. Therefore, it has been hypothesized that positive paying it forward (i.e., generalized reciprocity) evolves primarily when communities are interdependent, genetically related, or contain small sub-groups (Barta, McNamara, Huszár, & Taborsky, 2011; van Doorn & Taborsky, 2011; Rankin & Taborsky, 2009). Some research suggests that people will pay forward generosity without strict interdependence (Bartlett & Desteno, 2006; DeSteno, Bartlett, Baumann, Williams, & Dickens,

2010; Dufwenberg, Gneezy, Güth & van Damme; Fowler & Christakis, 2010; Hamilton & Taborsky, 2005; Nowak & Sigmund, 2005; Stanca, 2009); however these paradigms often give the *appearance* of interdependence because they involve both extensive interpersonal interaction and/or small group settings—factors which are generally missing from naturally occurring (or "well-mixed") social groups (Rankin & Taborsky, 2009). In contrast to these paradigms, real-world—and media accounts—of paying it forward often involve brief, one-time encounters with strangers (e.g., choosing to pay a stranger's layaway bill; Beck, 2011). The first goal of the current experiments is to examine whether behavior is paid forward in such anonymous situations.

The second goal is to examine which kinds of behavior are paid forward. Past research has investigated only one class of behavior—minimally altruistic behavior (i.e., small acts of help)—but here we distinguish between *equality*, *generosity*, and *greed*. Research suggests that equality is a deep-seated behavioral norm: at default, people split outcomes equally (i.e., 50/50; Messick & Schell, 1992), and even children and dogs show inequality aversion (Fehr, Bernhard, & Rockenbach, 2008; Range, Horn, Viranyi, & Huber, 2009). As a result, we predict that when people receive equality, they will pay forward this treatment in kind. Equality can be violated in both the positive (more-than-fairness) and negative (less-than-fairness) directions, and it is unknown whether these behaviors are differentially paid forward[1]. Generosity may propagate more than greed because generosity seems relatively rarer—at least to the news-watching layperson—and the amplified associated affective reactions engendered by rare and novel events may compel people to pay forward generosity (Ohman, Eriksson, Fredrikson, Hugdahl, &

[1] We note that economists and evolutionary biologists consider any behavior above pure self-interest as generous. Here we define generosity as treating others more than equally (i.e., more than fair), so that we can tease apart the relative effects of different kinds of positive behaviors.

Olofsson, 1974). Arguing for the relative power of greed over generosity, however, is an extensive body of research showing that negative stimuli evoke stronger responses and exert a greater influence on subsequent human and animal behavior than do positive stimuli (Baumeister, Bratslavsky, Finkenauer & Vohs, 2001; Fiske, 1980; Ito, Larsen, Smith & Cacioppo, 1998; Keysar, Converse, Wang & Epley, 2008; Rutte et al, 2006; Taylor, 1991; but see Wang, Galinsky, & Murnighan, 2009). As a result, we predict that greed would be paid forward more than generosity.

Our third goal is to examine the underlying affective drivers of paying behavior forward. While positive emotions (e.g., gratitude) lead people to pay forward generosity (Bartlett & DeSteno, 2006; DeSteno et al., 2010), these investigations do not include conditions under which people received equal or greedy treatment. Receiving greed likely engenders negative affect (Sanfey, Rilling, Aronson, Nystrom, & Cohen, 2003), which in turn typically exerts more influence than positive affect; thus, we predicted that negative affect will drive paying it forward behavior when considering the full suite of behaviors: equality, generosity, and greed.

Overview of the Experiments

We explore paying forward greed, equality and generosity in the form of both money (Experiments 1 and 2) and labor (Experiments 3, 4a and 4b). Experiment 2 explores the potential effect of overall resource distribution on paying forward greed versus generosity by manipulating recipients' initial financial endowment. Experiments 4a and 4b investigated the role of affect in paying it forward via both mediation and moderation.

Experiment 1: Paying Forward Money

One-hundred participants (51 female, M_{age} = 23.4) were recruited from subway stations and high traffic tourist areas in a Northeastern city. After giving consent, individual participants

were led to an isolated bench and told they would play an anonymous economic game in which one person splits money between themselves and another person (i.e., a dictator game).

Participants were assigned to one of four conditions. In the control condition (the *give-only* condition), participants assumed the role of the "splitter" in a standard dictator game, and received $6 to split between themselves and an anonymous future receiver. They kept as much as they wished, then sealed the rest in an envelope labeled "future receiver" and returned it to the experimenters.

In the three other conditions (the *greedy*, *equality*, and *generous* pay-it-forward conditions), each participant acted as both the receiver and the splitter. First, these participants received an envelope with money ostensibly left to them by a previous splitter. Upon opening the envelope, they saw that the previous splitter had given them a *greedy* ($0 of $6), *equal* ($3 of $6), or *generous* ($6 of $6) split. Participants rated the fairness of this split on a 5-point scale (1: *much less than fair*, 3: *fair*, 5: *much more than fair*). Participants then acted as the splitter in a second dictator game, splitting an additional $6 between themselves and a different future receiver. Thus, participants in the three pay-it-forward conditions played the central link in a three-person chain—first receiving then splitting. The amount given to the future receiver was our measure of paying-it-forward.

Results

The pay-it-forward conditions differed in perceived fairness, $F(2, 71) = 86.35$, $p < .001$, with the *greed* ($M = 1.56$, $SD = .82$), *equality* ($M = 3.16$, $SD = .37$), and *generous* ($M = 4.42$, $SD = .97$) conditions all differing from each other, all $ts > 8.73$, all $ps < .001$.

The amount paid forward varied by condition, $F(3, 96) = 9.09$, $p < .001$. As seen in Figure 1, participants in the *greedy* condition gave the least, followed by those in the *give-only*

condition, followed by the *equality* and *generous* conditions. All conditions differed from one another, all *t*s > 2.14, all *p*s < .05, except for the *equality* and the *generous* groups, $t(48) = .61$, $p = .55$. [2] Relative to the give-only condition, receiving greed led participants to be more selfish and receiving equal or generous outcomes led people to be more generous. However, receiving generosity did not prompt any greater generosity than receiving equal treatment, despite the fact that these treatments differed in terms of perceived fairness.

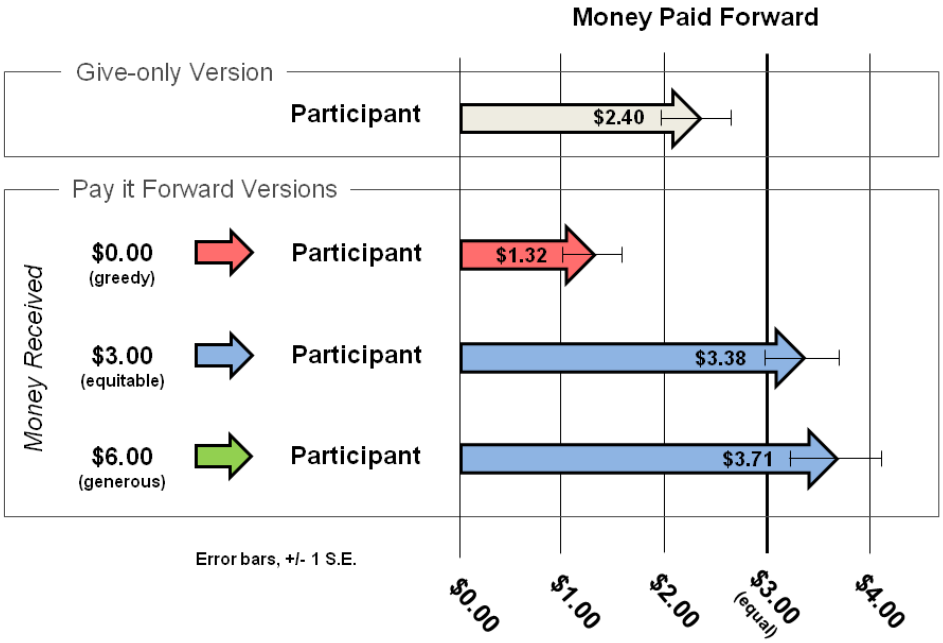


Figure 1: Money paid forward (out of a possible $6.00) in each condition (Experiment 1).

We also compared the difference between the amount received and the amount given in each condition—the closer this value is to zero, the more closely people paid their treatment

[2] This experiment revealed a significant condition by sex interaction in the pay-it-forward conditions, $F(2,68) = 7.46$, $p < .01$, whereby women gave more money in the greedy and generous conditions, but men gave more money in the equality condition. However, none of the subsequent experiments replicated these findings—or revealed any other significant sex differences—and so these specific results are assumed to be a product of reasonably small number of men and women in each condition.

forward in kind. The one-way ANOVA was significant, $F(2, 72) = 7.15$, $p = .001$. Equality ($M_{difference} = .38$) was paid forward more than greed ($M_{difference} = 1.36$), $p < .05$, which was paid forward marginally more than generosity ($M_{difference} = 2.29$), $p = .07$. Thus, behavior appears to be paid forward in anonymous interactions, but the extent depends on the type of behavior: equality propagates most, and greed propagates more than generosity.

Experiment 2: Manipulating Endowment

Experiment 1 does not differentiate the impact of social phenomena—receiving a greedy or generous split from another person—from the effects of simply having a larger or smaller endowment. In Experiment 2, we randomly endowed people with either $0 or $6 before they received greedy or generous splits, and predicted that greed and generosity would influence paying-it-forward more than mere endowment.

Method

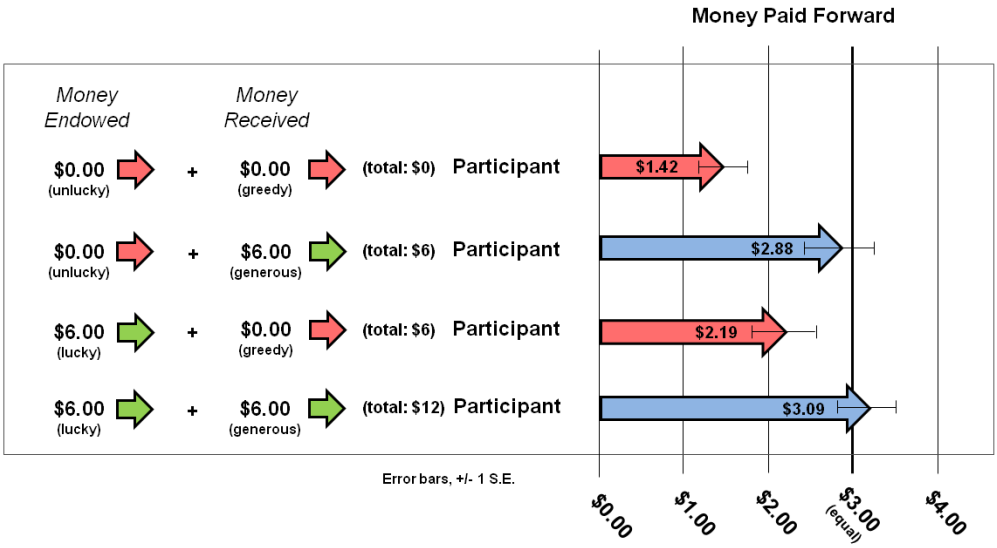
One hundred participants (50 female, $M_{age} = 24.3$) were recruited as in Experiment 1. This experiment followed a 2 (initial random endowment: *lucky* or *unlucky*) × 2 (social treatment: *greedy* or *generous*) design. Participants first picked three numbers then rolled a die. If one of their lucky numbers came up, they were given $6 (*lucky* condition), if not, they received $0 (*unlucky* condition). Following this endowment, the procedure was identical to the *greedy* and *generous* conditions of Experiment 1.

Results

A 2 (initial random endowment: *lucky* or *unlucky*) × 2 (social treatment: *greedy* or *generous*) ANOVA revealed main effect of social treatment on paying it forward, $F(3, 95) = 8.19$, $p < .01$, but no main effect for initial random endowment, $F(3, 95) = 1.42$, $p > .23$, and no interaction, $F(3, 95) = 0.46$, $p > .49$. Those who received a greedy split paid forward less than

those who received a generous split (Figure 2); those who had received $0 or $6 due to luck were less likely to pay this behavior forward, suggesting that social treatment plays a role in paying behavior forward over and above one's endowment.

When both social treatment and the initial random endowment were entered as simultaneous predictors for paying it forward in a regression, social treatment significantly predicted paying it forward behavior, $\beta = .30$, $t(97) = 3.15$, $p < .005$, but not initial endowment, $\beta = .15$, $t(97) = 1.50$, $p = .13$. More descriptively, the fact that those who received a total of $12 (who were lucky and received generosity) paid forward only 21¢ more than those who received $6 (who were unlucky and received generosity) further suggests that endowment is not driving our effects.[3] As before, the relative difference between money received and money paid forward revealed that greed ($M_{difference} = 1.81$) was paid forward more than generosity ($M_{difference} = 3.02$), $F(1, 95) = 8.60$, $p < .005$.



[3] Perhaps the most compelling argument against the role of endowment in paying it forward is that, in Experiment 1, equality was paid forward most of all despite having an endowment in between greed and generosity. In other words, if endowment was driving the effect, one would expect that generosity (total endowment: $12) should be paid forward most, followed by equality (total endowment: $9), followed by greed (total endowment: $6)—which is not the observed pattern of data.

Figure 2: Money paid forward (out of a possible $6.00), after receiving both a random initial endowment and a social treatment of either greed or generosity (Experiment 2).

Experiment 3: Paying Forward Labor

Experiments 3, 4a and 4b explore paying it forward using a different currency: labor. In life, there are both enjoyable and onerous tasks, with the deeds of others leaving people with more or less of each; we explored whether people who received greedy and generous divisions of tasks paid forward that treatment to others. In addition, we test paying-it-forward in an inherently anonymous environment: an internet-based labor market.

Method

Participants (N = 60, 12 female; M_{age} = 26.9 years) were recruited through Amazon's Mechanical Turk, an online labor recruitment tool (Buhrmester, Kwang, & Gosling, 2011); most importantly, the tool allowed us to recruit participants who would engage in truly anonymous, fleeting interactions. As in Experiments 1 and 2, participants were told that they were the middle link in an anonymous chain (in this case, a chain of labor): they would first play the role of the receiver, then that of the splitter. The experiment consisted of both good tasks (rating humorous stimuli) and bad tasks (circling vowels in dense foreign text); each split consisted of a total of four tasks (two good, two bad).

Participants first received either a *greedy* split (the previous participant had completed both good tasks, leaving only bad tasks for the current participant) or a *generous* split (the previous participant had completed both bad tasks, leaving only good ones). Participants then acted as the splitter, deciding how to split an additional four tasks between themselves and an anonymous future participant. They could pay forward either greed (leaving both bad tasks),

equality (leaving one good and one bad task), or generosity (leaving both good tasks). Finally, participants completed their four tasks (two given from the previous participant, and the two not given to the future participant). The number of good tasks left for the future anonymous participant (0, 1, or 2) was our measure of paying it forward.

Results

The number of good tasks participants assigned to the future participant varied by condition, $F(1, 58) = 5.69$, $p = .02$. Participants in the *greedy* condition ($M = 0.50$, $SD = .57$) gave significantly fewer good tasks than participants in the *generous* condition ($M = 0.86$, $SD = .59$). We again assessed the extent to which behaviors were paid forward by comparing the difference between good tasks received and given. A one-way ANOVA revealed significant differences in paying it forward, $F(1, 58) = 18.42$, $p < .001$; as before, greed ($M_{difference} = 0.50$) was paid forward more than generosity ($M_{difference} = 1.14$).

Experiment 4a: Negative Affect and Paying it Forward

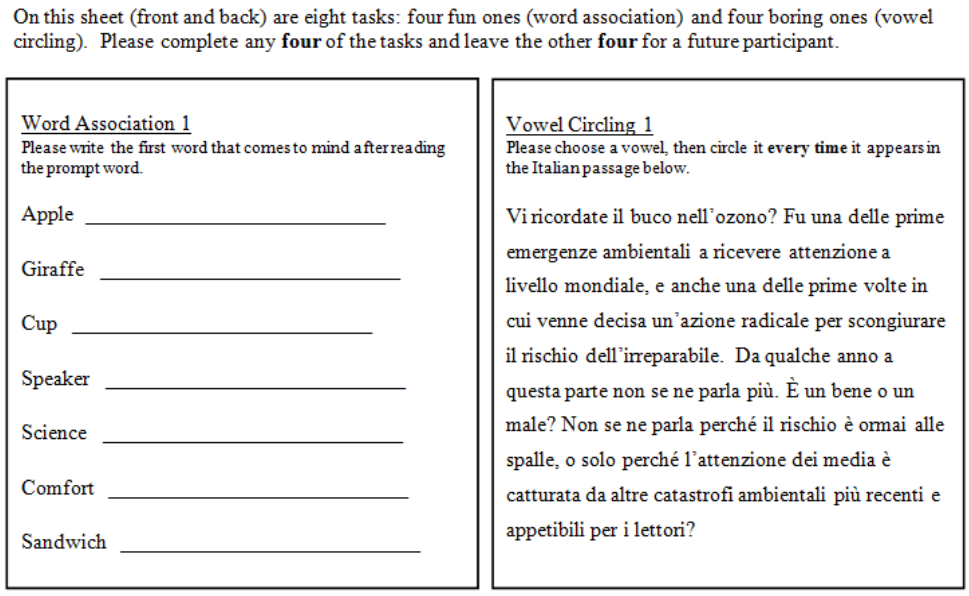
In Experiments 4a and 4b, we explore whether the asymmetry in paying forward greed versus generosity is driven by negative affect, and provide converging evidence by using both mediation (Experiment 4a) and moderation (Experiment 4b) approaches (Spencer, Zanna & Fong, 2005).

Method

Experiment 4a explicitly tested for potential mediation by both general positive affect and general negative affect, as well as a commonly studied discrete negative emotion: anger (Allred, Mallozzi, Matsui & Raia, 1997). In contrast to previous studies that investigated only good deeds (e.g., Bartlett & Desteno, 2006), we predicted that the inclusion of greed would lead negative affect to be the best predictor of overall paying it forward behavior; moreover, we

predicted that generalized negative affect would be more powerful than the specific negative emotion of anger in predicting pay it forward behavior (Pillutla & Murnighan, 1996).

Ninety-six participants (63 female, M_{age} = 30.1) were recruited as in Experiment 1. Similar to Experiment 3, participants completed a series of tasks: good tasks consisted of making free associations to words, and bad tasks consisted of circling the vowels in dense Italian prose (Figure 3). Each participant was given eight tasks—four good and four bad—to split between themselves and a future participant; participants completed half of the eight tasks in any combination before passing on the remaining tasks by placing them in an envelope addressed to a "Future Participant." In the *give-only* condition, participants completed four of the eight tasks and passed on the remainder. In the three pay-it-forward conditions, participants first learned that a previous participant (the splitter) had been asked to split eight tasks and had left them either a *generous* (completing all four bad and leaving them all four good tasks), *greedy* (completing all four good and leaving them all four bad tasks), or *equal* division of labor (completing two tasks of each kind).



On this sheet (front and back) are eight tasks: four fun ones (word association) and four boring ones (vowel circling). Please complete any **four** of the tasks and leave the other **four** for a future participant.

Word Association 1

Please write the first word that comes to mind after reading the prompt word.

Apple _____

Giraffe _____

Cup _____

Speaker _____

Science _____

Comfort _____

Sandwich _____

Vowel Circling 1

Please choose a vowel, then circle it **every time** it appears in the Italian passage below.

Vi ricordate il buco nell'ozono? Fu una delle prime emergenze ambientali a ricevere attenzione a livello mondiale, e anche una delle prime volte in cui venne decisa un'azione radicale per scongiurare il rischio dell'irreparabile. Da qualche anno a questa parte non se ne parla più. È un bene o un male? Non se ne parla perché il rischio è ormai alle spalle, o solo perché l'attenzione dei media è catturata da altre catastrofi ambientali più recenti e appetibili per i lettori?

Figure 3: Examples of a "good task" (left) and a "bad task" (right) given to participants in Experiment 4.

Immediately after receiving this split, participants completed an abbreviated Positive and Negative Affect Schedule (PANAS; Watson, Clark & Tellegen, 1988), indicating the extent to which they were feeling a variety of positive (happy, enthusiastic, excited, alert, inspired) and negative (distressed, upset, afraid, nervous) affective states on 5-point scales (1: *not at all*, 5: *extremely*). We also assessed feelings of anger on the same scale. Participants then rated the fairness of the split as in Experiment 1, completed the tasks left for them by the previous player, and then acted as a splitter by dividing an *additional* eight tasks (four good, four bad) between themselves and a future anonymous recipient. The division of tasks passed to the anonymous recipient (good v. bad) was our measure of paying it forward.

Results

Ratings of task enjoyment (1: *not at all enjoyable*, 5: *extremely enjoyable*) confirmed that participants found the good tasks (M = 3.57, SD = 1.12) more enjoyable than the bad tasks (M = 2.62, SD = 1.22), $t(95) = 8.38$, $p < .001$.

Paying it Forward

The number of good tasks participants assigned to the future participant varied by condition, $F(3, 87) = 4.23$, $p < .01$. Participants in the *greedy* condition gave significantly fewer good tasks than participants in all other conditions (all $ts > 2.50$, all $ps < .03$; Figure 3). Participants in the *give-only* condition gave the next least, though not significantly less than those in the *equality* or *generous* conditions, all $ts < 1.25$, all $ps > .22$. We again compared the difference between amount received and amount given. The one-way ANOVA was significant, $F(2, 69) = 24.45$, $p < .001$. As in Experiment 1, equality ($M_{difference} = .04$) was paid forward more

than greed ($M_{difference}$ = 1.04), p = .001, which was paid forward more than generosity ($M_{difference}$ = 2.08), all ts > 3.45, p < .001.

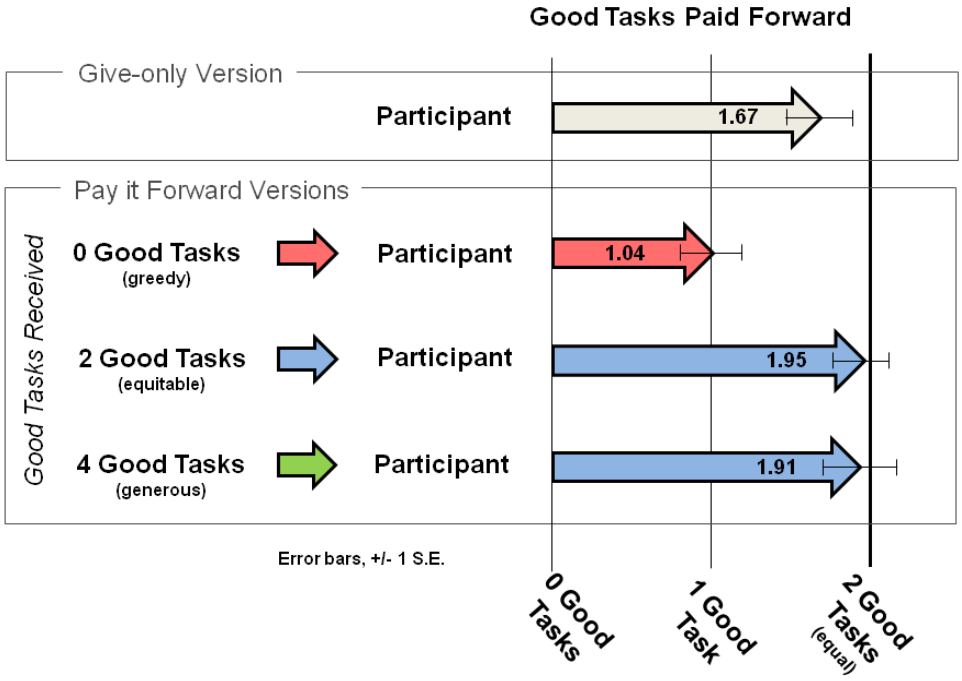


Figure 4: Good tasks paid forward (out of a possible 4) in each condition (Experiment 4a).

Affect

Items from the PANAS were averaged to form separate indices of positive and negative affect (Cacioppo, Gardner, & Berntson, 1999). One-way ANOVAs revealed significant differences between the three pay-it-forward conditions for negative affect, $F(2, 69) = 7.78$, p = .001, and anger, $F(2, 69) = 8.95$, p < .001, but not positive affect, $F(2, 69) = 1.69$, p = .19. See Table 1.

	Split Type		
Affect Type	Greedy	Equal	Generous
Negative Affect	1.78 (*.86*)^{a}	1.15 (*.26*)^{b}	1.19 (*.29*)^{b}
Positive Affect	2.56 (*.88*)^{a}	2.61 (*.78*)^{a}	2.95 (*.68*)^{a}
Anger	1.96 (*1.10*)^{a}	1.12 (*.46*)^{b}	1.21 (*.51*)^{b}

Note: Means (*SD*). For each type of affect, means with a different subscript differ at p < .05.

Table 1: Participant affect after receiving greedy, generous or equal splits of labor.

Mediation Analysis

To test whether affect predicted paying-it-forward behavior, positive affect, negative affect, and anger were entered in a linear regression predicting good tasks paid forward. Negative affect, β = -.33, $t(68) = 2.29$, $p = .025$, but not positive affect, $\beta = .08$, $p = .47$, or anger β = -.10, $p = .49$, predicted paying it forward. A bootstrapping mediation analysis using 5000 samples (Preacher & Hayes, 2008) revealed that negative affect mediated the link between tasks received (i.e., condition) and tasks paid forward, $F(2,69) = 9.07$, $p < .001$, 95% CI [.04, .14]; neither positive affect (95% CI [-.01, .08]) nor anger (95% CI [-.01, .14]) mediated this link.

Interestingly, when positive and negative affect and anger were regressed on paying it forward in the *generous* condition, only positive affect did predict paying forward, $\beta = .41$, $p = .06$ (negative affect: $\beta = .07$, $p = .78$; anger: $\beta = .14$, $p = .51$), consistent with previous research solely examining paying forward generosity (Bartlett & Desteno, 2006). Our results suggest, however, that when accounting for the full range of deeds— not just generosity, but also greed and equality—negative affect best predicts paying it forward.

Experiment 4b

If negative affect drives paying greed forward, then reducing negative affect should have the parallel effect of reducing the tendency to pay greed forward. Experiment 4b introduced a filler task between receiving and splitting, to test whether a positive mood intervention would moderate pay-it-forward behavior. Relying on previous research demonstrating that viewing cartoons repairs a negative mood (Göritz, 2006), we predicted that relative to a neutral task (viewing at abstract art), reading cartoons would mitigate paying greed forward.

Method

Participants (N = 165, 88 female; M_{age} = 30.87) were recruited through Amazon's Mechanical Turk.

This experiment followed a 2 (receive: *greedy*, *generous*) × 2 (filler task: *neutral*, *positive*) design. We used the same "good" and "bad" tasks as in Experiment 4. Participants first received either a *greedy* split (the previous participant had completed both good tasks, leaving only bad tasks for the current participant) or a *generous* split (the previous participant had completed both bad tasks, leaving only good ones). Participants then rated their liking for either three pieces of abstract art (*neutral*) or three cartoons (*positive*), before next splitting an additional four tasks (two good, two bad) between themselves and an anonymous future participant. We predicted that a positive affect intervention would reduce participants' tendency to pay greed forward.

Results

Results from a 2 (receive: *greedy*, *generous*) × 2 (filler task: *neutral*, *positive*) ANOVA revealed a main effect of receiving greed or generosity, $F(1, 161) = 3.74$, $p = .05$, no effect of filler task, $p > .14$, and the predicted interaction effect, $F(1, 161) = 7.00$, $p < .01$, on the number of good tasks given. In the *greedy* condition, those who completed the neutral filler task (M = 0.37, SD = .54) paid greed forward more than those in who completed the positive filler task (M = 0.78, SD = .63) $F(1,161) = 7.94$, $p < .01$. There was no effect of filler task for those who received a *generous* split ($M_{positive}$ = 0.71; $M_{neutral}$ = 0.83); $p = .39$, suggesting that while reducing negative affect reduces paying greed forward, increasing positive affect fails to increase paying generosity forward.

Taken together, Experiments 4a and 4b provide evidence that the tendency to asymmetrically pay forward greed stems from negative affect. In Experiment 4a, negative affect

mediated the link between tasks received and tasks paid forward; in Experiment 4b, a mood improving filler eliminated the paying forward of greed.

General Discussion

Five experiments demonstrate that people pay forward behavior in the sorts of fleeting, anonymous situations that increasingly typify people's day-to-day interactions. These data reveal that—in contrast to the focus of media, laypeople, and prior research—true generosity is paid forward less than both greed and equality. Equality leads to equality and greed leads to greed, but true generosity results only in a return to equality—an asymmetry driven by the greater power of negative affect. These results are both encouraging and dispiriting. When people receive equality, they rise above their baseline selfishness and pay forward this equality. Furthermore, the stability of equality in pay-it-forward situations suggests that this basic level of pro-social behavior can propagate even in fully anonymous interactions. Deviations from equality, however, are paid forward only in the negative direction: true generosity prompts only equality, whereas greed prompts people to be greedier than they would be at baseline.

By examining paying it forward in the most parsimonious of environments with a novel paradigm, we show that generalized reciprocity can develop without the existence or appearance of interdependence—which in turn has implications for biological theories of cooperation. By examining paying it forward generosity, equality and greed of both money and labor we extend the study of paying behavior forward to everyday experiences. Finally, by documenting the asymmetry between greed and generosity and the underlying affective mechanism, we highlight a more sinister side of paying it forward—and hence human nature—that previous research and media attention concerning this phenomenon has largely ignored.

We note that our people are not often asked to fill envelopes with small amounts of money in their everyday lives, and so the meaningfulness of the task and the generalizability of our findings are important questions. The fact that participants responded consistently to even small amounts of money—both behaviorally and affectively—suggests that they did find the tasks meaningful and emotionally evocative. Moreover, Experiment 2 suggests that people respond less to monetary value *per se* and more to social aspect of greed and generosity. Similarly, our experiments were small stakes, and future research should generalize the effects to large amounts of money and labor; we found that receiving generosity did not differ from receiving equal treatment in terms of behavior or affect, but such a difference may emerge for extremely generous acts[4]. Finally, while our studies all used similar minimal paradigms, they still capture paying it forward in the real world, especially as interactions increasingly take place via anonymous internet channels.

The research presented here provides the first systematic investigation into paying forward greed, generosity and equality. In so doing, it suggests a nuanced view of human nature. Equality is paid forward in anonymous situations, suggesting that people will act fairly even when no-one is watching—if they have first been treated fairly. Although the recipients of generosity act positively—equitably—towards others, our results suggest that the *magnitude* of the positive behavior passed forward is less than what is received, whereas greed is paid forward in more equal measure. This asymmetry complements findings in both psychology and biology on the effects of socio-negative versus socio-positive outcomes (Rutte, Taborsky & Brinkhof, 2006), and provides new theoretical directions for evolutionary models of generalized reciprocity, which thus far have examined only primarily generous behaviors (Barta, McNamara,

[4] However, it is important to note that generous and equal acts are distinguishable by ratings of fairness: generous acts are rated as "more than fair" and equal acts as only "fair." See Experiment 1.

Huszár, & Taborsky, 2011). By looking at these three types of behavior, these data also extend and quantify past social psychological work on equity with the world (Austin & Walster, 1974) and the licensing effects of victimization (Zitek, Jordan, Monin & Leach, 2010), both of which suggest that people will act anti-socially if they have been treated less than fairly. The question is under what conditions cause people to be genuinely kind to others (Inbar, Zitek, Jordan, Fleuren & Breij, 2012)?

From the perspective of the person who is paying-it-forward, the asymmetry between greed and generosity may stem from a misconception of the threshold required for an act to truly reflect paying it forward. The person who awakes to gratefully find his long driveway cleared of snow may feel that he has "paid forward" the generous act by brushing off a bit of snow from a nearby car, but this discount rate is sufficiently high that the perpetuation of good will likely ends there. On the other hand, the person who awakes to find his driveway completely blocked from an errant snowplow may pile all that extra snow onto another car, thereby creating a significantly longer chain of ill will. This asymmetry suggests that to create chains of positive behavior, people should focus less on performing random acts of generosity, and more on treating others equally—while refraining from random acts of greed.

References

Allred, K.G., Mallozzi, J., Matsui, F., & Raia, C.P. (1997). The influence of anger and compassion on negotiation performance. *Organizational behavior and human decision processes, 70*, 175-187.

Austin, W., & Walster, E. (1974). Participants' reactions to "Equity with the world." *Journal of Experimental Social Psychology*, *10*(6), 528–548. doi:10.1016/0022-1031(74)90077-8

Barta, Z., McNamara, J.M., Huszár, D.B. & Taborsky, M. (2011). Cooperation among non-relatives evolves by state-dependent generalized reciprocity. *Proceedings of the Royal Society B, 278*, 843-848.

Bartlett, M. Y., & DeSteno, D. (2006). Gratitude and prosocial behavior: helping when it costs you. *Psychological Science*, *17*(4), 319-325. doi: 10.1111/j.1467-9280.2006.01705.x.

Baumeister, R. F., Bratslavsky, E., Finkenauer, C., & Vohs, K. D. (2001). Bad is stronger than good. *Review of General Psychology*, *5*(4), 323-370. doi: 10.1037/1089-2680.5.4.323.

Beck, G. (2011, December 25). Layaway angels spread joy during Christmas season. *Glenn Beck: The Fusion of Entertainment and Enlightenment*. Retrieved April 6, 2012, from http://www.glennbeck.com/content/blog/show/layaway-angels-spread-joy-during-christmas-season/

Brosnan, S. F., & de Waal, F. B. M. (2003). Monkeys reject unequal pay. *Nature*, *425*(6955), 297–299. doi:10.1038/nature01963

Bshary, R. & Grutter, A.S. (2006). Image scoring and cooperation in a cleaner fish mutualism. *Nature, 441*, 975-978.

Buhrmester, M., Kwant, T., & Gosling, S.D. (2011). Amazon's mechanical turk: A new source of inexpensive, yet high-quality, data? *Perspectives on Psychological Science, 6*, 3-5.

Cacioppo, J. T., Gardner, W. L., & Berntson, G. G. (1999). The affect system has parallel and integrative processing components: Form follow function. *Journal of Personality and Social Psychology, 76,* 839-855.

DeSteno, D., Bartlett, M., Baumann, J., Williams, L., & Dickens, L. (2010). Gratitude as moral sentiment: Emotion-guided cooperation in economic exchange. *Emotion, 10,* 289-293.

Diekmann, A. (2004). The power of reciprocity: Fairness, reciprocity, and stakes in variants of the dictator game. *Journal of Conflict Resolution, 48,* 487-505.

Dufwenberg, M., Gneezy, U., Güth, W., & van Damme, E. (2001). Direct vs. indirect reciprocity: An experiment. *Homo Oeconomicus, 18,* 19-30.

Emerson, R.W. (2007). Compensation. In *Essays: First and Second Series*. Gloucester, UK: Dodo Press. (Original work published 1841)

Fehr, E., Bernhard, H., & Rockenbach, B. (2008). Egalitarianism in young children. *Nature, 454*(7208), 1079–1083. doi:10.1038/nature07155

Fiske, S. T. (1980). Attention and weight in person perception: The impact of negative and extreme behavior. *Journal of Personality and Social Psychology, 38*(6), 889-906.

Fowler, J. H., & Christakis, N. A. (2010). Cooperative behavior cascades in human social networks. *Proceedings of the National Academy of Sciences of the United States of America, 107*(12), 5334-5338.

Franklin, B. (1840). Letter to Benjamin Webb. In J. Sparks (Ed.), *The Works of Benjamin Franklin*. Boston, MA: Hilliard, Gray, and Company. (Original work published 1784)

Göritz, A. S. (2007). The induction of mood via the WWW. *Motivation and Emotion, 31*(1), 35-47.

Hamilton, I. M., & Taborsky, M. Contingent movement and cooperation evolve under generalized reciprocity. *Proceedings of the Royal Society B, 272*(1578), 2259-2267.

Hyde, C. R. (2000). *Pay It Forward*. New York, NY: Pocket.

Inbar, Y., Zitek, E., Jordan, A. H., Fleuren, B., & Breij, S. J. A. (2012). Giving back: Unearned rewards promote prosociality. Manuscript in preparation.

Ito, T. A., Larsen, J. T., Smith, N. K., & Cacioppo, J. T. (1998). Negative information weighs more heavily on the brain: the negativity bias in evaluative categorizations. *Journal of Personality and Social Psychology, 75*(4), 887-900.

Keysar, B., Converse, B. A., Wang, J., & Epley, N. (2008). Reciprocity is not give and take: Asymmetric reciprocity to positive and negative acts. *Psychological Science, 19*, 1280-1286. doi: 10.1111/j.1467-9280.2008.02223.x.

Messick, D. M., & Schell, T. (1992). Evidence for an equality heuristic in social decision making. *Acta Psychologica, 80*(1–3), 311–323. doi:10.1016/0001-6918(92)90053-G

Nowak, M. A., & Sigmund, K. (2005). Evolution of indirect reciprocity. *Nature, 437*(7063), 1291-1298. doi:10.1038/nature04131

Ohman, A., Eriksson, A., Fredrikson, M., Hugdahl, K., & Olofsson C. (1974). Habituation of the electrodermal orienting reaction to potentially phobic and supposedly neutral stimuli in normal human subjects. *Biological Psychology, 2*, 85–93.

Pillutla, M. M., & Murnighan, J. K. (1996). Unfairness, anger, and spite: Emotional rejections of ultimatum offers. *Organizational Behavior and Human Decision Processes, 68*(3), 208–224. doi:10.1006/obhd.1996.0100

Preacher, K.J. & Hayes, A.F. (2008). Asymptomatic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40,* 879-891.

Putnam, R.D. (2001). *Bowling alone*. New York: Simon & Schuster.

Range, F., Horn, L., Viranyi, Z., & Huber, L. (2009). The absence of reward induces inequity aversion in dogs. *Proceedings of the National Academy of Sciences, 106*(1), 340–345. doi:10.1073/pnas.0810957105

Rankin, D.J. & Taborsky, M. (2009). Assortment and the evolution of generalized reciprocity. *Evolution, 63*, 1913-1922.

Rutte, C. & Taborsky, M. (2007). Generalized reciprocity in rats. *PloS Biology, 5*, 1421-1425.

Rutte, C. Taborsky, M. & Brinkhof, M. W. G. (2006). What sets the odds of winning and losing? *Trends in Ecology and Evolution*, *21*(1), 16-21.

Sanfey, A. G., Rilling, J. K., Aronson, J. A., Nystrom, L. E., & Cohen, J. D. (2003). The neural basis of economic decision-making in the ultimatum game. *Science*, *300*(5626), 1755-1758. doi: 10.1126/science.1082976.

Spencer, S.J., Zanna, M.P., & Fong, G.T. (2005). Establishing a causal chain: Why experiments are often more effective than meditational analyses in examining psychological processes. *Journal of Personality and Social Psychology, 89*, 845-851.

Stanca, L. (2009). Measuring indirect reciprocity: Whose back do we scratch? *Journal of Economic Psychology*, *30*(2), 190-202.

Taylor, S. E. (1991). Asymmetrical effects of positive and negative events: the mobilization-minimization hypothesis. *Psychological Bulletin*, *110*(1), 67-85.

Van Doorn, G.S. & Taborsky, M. (2011). The evolution of generalized reciprocity on social interaction networks. *Evolution, 66,* 651-664.

Wang, C. S., Galinsky, A. D., & Murnighan, J. K. (2009). Bad drives evaluations but good propels behavior. *Psychological Science, 20*(5), 634-644.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063-1070.

Zitek, E. M., Jordan, A. H., Monin, B. & Leach, F. R. Victim entitlement to behave selfishly. *Journal of Personality and Social Psychology, 98*(2), 245-255.

Author Note

We thank the Social Sciences and Humanities Research of Council of Canada and the Institute for Humane Studies fellowships for financial support. For assistance with data collection, we thank Michael Bailey, David Caparrelli, Angela Chouinard, Katherine Flaschen, Alex Hacker, Kiya Komaiko, Lauren Pavka, Jason Popps, Corey Rosenberg, Traci Schneider, Dorian Storbeck, and Mimi Zhuravitsky. For helpful advice, we thank Dave Rand and Piercarlo Valdesolo.

Tables

Table 1: Participant affect after receiving greedy, generous or equal splits of labor.

	Split Type		
Affect Type	Greedy	Equal	Generous
Negative Affect	1.78 (*.86*)[a]	1.15 (*.26*)[b]	1.19 (*.29*)[b]
Positive Affect	2.56 (*.88*)[a]	2.61 (*.78*)[a]	2.95 (*.68*)[a]
Anger	1.96 (*1.10*)[a]	1.12 (*.46*)[b]	1.21 (*.51*)[b]

Note: Means (*SD*). For each type of affect, means with a different subscript differ at $p < .05$.

Figures

Figure 1: Money paid forward (out of a possible $6.00) in each condition (Experiment 1).

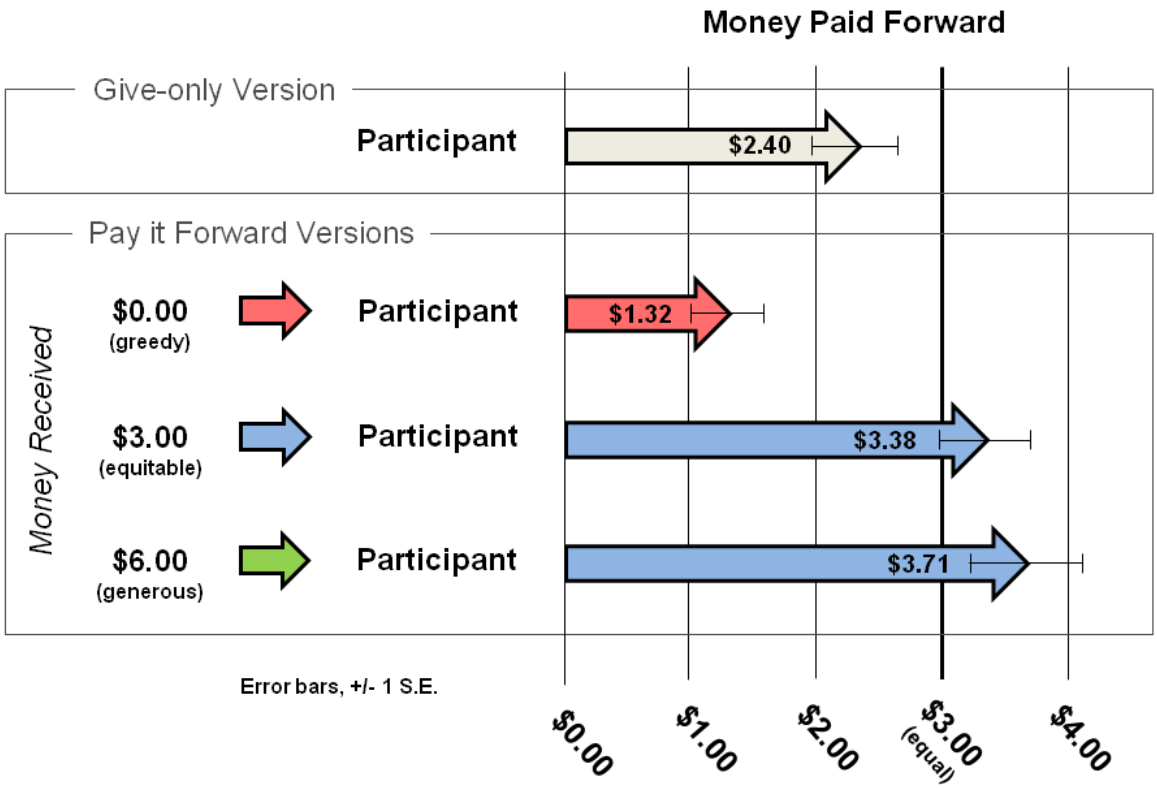


Figure 2: Money paid forward (out of a possible $6.00), after receiving both a random initial endowment and a social treatment of either greed or generosity (Experiment 2).

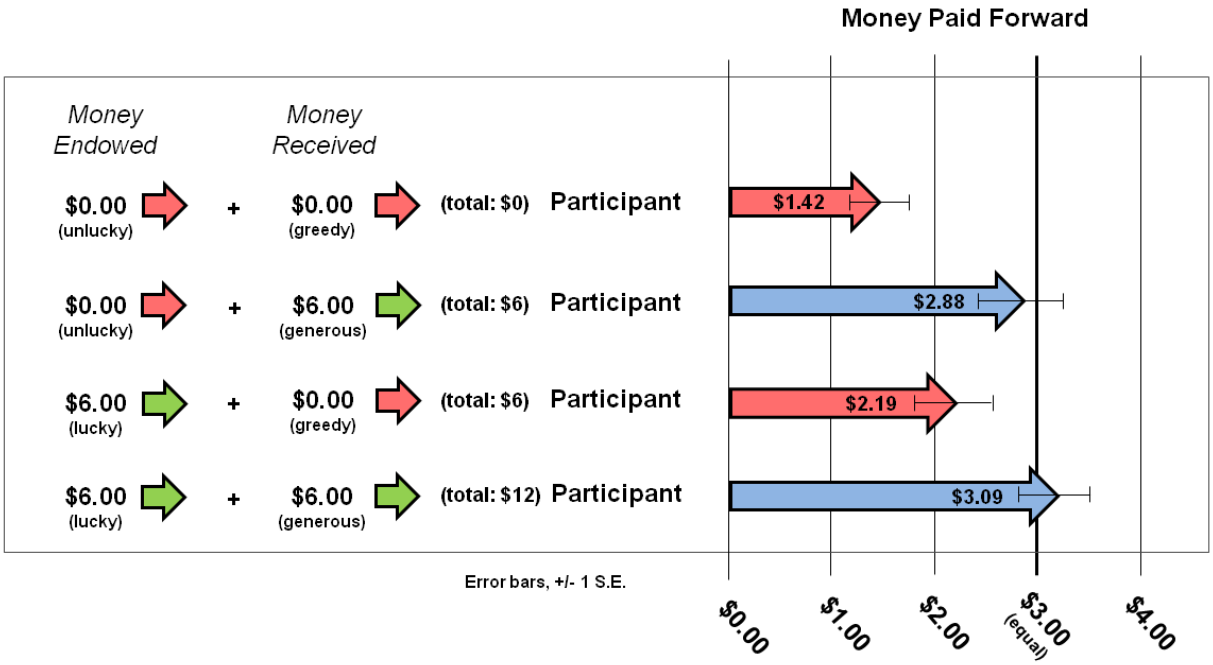
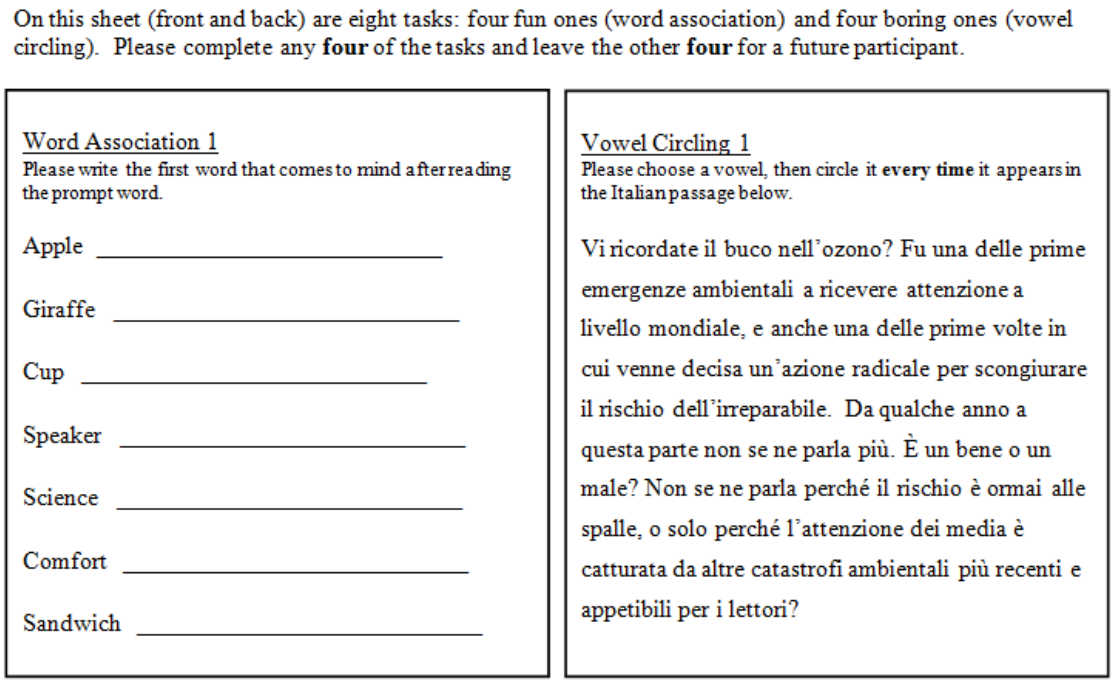


Figure 3: Examples of a “good task” (left) and a “bad task” (right) given to participants in Experiment 3.



On this sheet (front and back) are eight tasks: four fun ones (word association) and four boring ones (vowel circling). Please complete any **four** of the tasks and leave the other **four** for a future participant.

Word Association 1

Please write the first word that comes to mind after reading the prompt word.

Apple _____

Giraffe _____

Cup _____

Speaker _____

Science _____

Comfort _____

Sandwich _____

Vowel Circling 1

Please choose a vowel, then circle it **every time** it appears in the Italian passage below.

Vi ricordate il buco nell’ozono? Fu una delle prime emergenze ambientali a ricevere attenzione a livello mondiale, e anche una delle prime volte in cui venne decisa un’azione radicale per scongiurare il rischio dell’irreparabile. Da qualche anno a questa parte non se ne parla più. È un bene o un male? Non se ne parla perché il rischio è ormai alle spalle, o solo perché l’attenzione dei media è catturata da altre catastrofi ambientali più recenti e appetibili per i lettori?

Figure 4: Good tasks paid forward (out of a possible 4) in each condition (Experiment 3)